cheaper to insure buildings than to incur the expense of erecting lightning-rods, the author quotes a number of authorities in support of the advisability of putting up rods, and gives rules to be observed in doing so.

*Bulletin of the New York Mathematical Society*, vol. i., Nos. 8 and 9 (New York, 1892).—The illustrious German mathematician, Leopold Kronecker, died recently at Berlin (December 29, 1891). No. 8 (pp. 173-84) opens with a most interesting article, by H. B. Fine, entitled "Kronecker and his Arithmetical Theory of the Algebraic Equation." This is biographical and analytical. A short note, by Prof. Cajori, follows, on the "Multiplication of Series." The concluding note is by Dr. Macfarlane, "On Exact Analysis as the Basis of Language." This is a brief abstract of a paper read before the Society (March 5, 1892).—No. 9 gives an account of a recent paper in the *Mathematische Annalen* (vol. xxxviii.), by M. Hilbert, under the head "Topology of Algebraic Curves." The writer, L. S. Hulburt, recasts the theory, with the view of making the theory more intelligible, and corrects some slight inaccuracies. Dr. Merriman abstracts a paper (read before the Society) on "Final Formulas for the Algebraic Solution of Quartic Equations." This number closes with a full account of Poincaré's "Mécanique Céleste," by E. W. Brown. The usual short notes and list of new publications are given at the end of each number.

*Memoirs of the Mathematical Section of the Odessa University*, vol. xiii.—On the theory of linear differential equations, by M. Rudzky.—The mechanics of a system subject to similar changes, by D. Seiliger, part iii. The paper is followed by a description of an apparatus, the "homoyograph," three spots of which always take such positions as to make similar triangles.—Experimental researches into the compressibility of glass and mercury, by G. De-Metz. The absolute compressibility of mercury has been determined on the two methods of Regnault and Jamin, as also on a third method which results from the equations of Lamé in his "Leçons sur l'Élasticité," and the seventh memoir of Regnault. The results arrived at in these very elaborate researches are very near to those arrived at by Amagat.—Volume xii. of the same periodical consists of a work by J. Timtchenko, on the foundations of the theory of analytical functions. The aim of the author is to contribute towards the elaboration of a *general* theory of functions which would include Weierstrass's theory as well. The first part, now published, contains the historical review of the development of the theory.

*Bulletin de la Société des Naturalistes de Moscou*, 1891, Nos. 2 and 3.—The Speeton clays and their equivalents, by A. Pavloff and G. W. Lamplugh.—Contributions to the study of molecular forces in chemically simple bodies, on the ground of thermodynamics, by J. Weinberg.—Studies on the development of Amphipodes, part v., by Madame Catherine Wagner (in French, with two plates). The development of the embryo of the *Melita palmata* is apparently quite similar to that of *Gammarus* and *Caprella* in its earlier stages, but the microscopic observation of cuttings through the embryo discloses several interesting peculiarities, which are described and illustrated.—What is the Hipparion?, by Marie Pavloff (in French), being an answer to critical remarks, by M. Trouessart, in *Annuaire Géologique Universel*, tome vi., relative to Marie Pavloff's work on the evolution of Ungulates.—On a new apparatus for determining the moment of inertia of a body, by N. Joukovsky (in French).—On *Pteromonas alata*, Cohn, by M. Golenkin (in German).—The present state of our knowledge of the contents of the cells of the Phycochromaceæ, by Valerian Deinega (in German). The author has come to no definite results as to the nucleus in the Phycochromaceæ, especially in the thread-like species; new colouring methods ought to be discovered.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Royal Society**, June 2.—"Supplementary Report on Explorations of Erect Trees containing Animal Remains in the Coal-formation of Nova Scotia." By Sir J. William Dawson, F.R.S.

To the memoir which I had the honour to present to the Royal Society on this subject in 1882[1] I appended a note from Dr. Scudder, of Cambridge, U.S., so well known for his researches in fossil Insects and Arachnidans, in which he gave a preliminary account of the remains of Arthropods in my collections which I had submitted to him. He has only in the present year completed his examination of these remains, most of which are very fragmentary, and much damaged by unequal pressure. The result has been embodied in a Report on Canadian Fossil Insects, now in course of publication by the Geological Survey of Canada.

In this Report he will describe from the contents of the Sigillarian stumps extracted by me, with the aid of the grant of this Society, three new species of Myriapoda, making, with the five previously known from these remarkable repositories, eight in all, belonging to two families, Archiulidæ and Euphoberidæ, and to three genera, *Archiulus*, *Xylobius*, and *Amynilyspes*. The three new species are *Archiulus euphoberioides*, Sc., *A. Lyelli*, Sc., and *Amynilyspes* (sp.). The remains of Scorpions he refers to three species, *Mazonia acadica*, Sc., *Mazonia* (sp.), and a third represented only by small fragments. The characters of the species referred to *Mazonia* he considers as tending to establish the generic distinctness of *Mazonia* from *Eoscorpius*. Dr. Scudder also notices the fragment of an insect's head containing part of a facetted eye, mentioned in my memoir, and considers it probably a portion of a Cockroach.

Much credit is due to Dr. Scudder for the care and skill with which he has worked up the mostly small and obscure fragments which I was able to submit to him, and which are probably little more than *débris* of the food of the Amphibians living for a time in these hollow stumps, and devouring such smaller animals as were so unfortunate as to be imprisoned with them. In this connection the suggestion of Dr. Scudder is worthy of attention, that the scaly armour of the smaller Microsaurians may have been intended to defend them against the active and venomous Scorpions which were their contemporaries, and some of which were sufficiently large to be formidable antagonists to the smaller land Vertebrates of the period.

The report of Dr. Scudder will complete the account of the land animals of the erect Sigillariæ of the South Joggins, unless by new falls of the cliff fresh trees should be exposed. From 1851, when the first remains were obtained from these singular repositories by the late Sir Charles Lyell and the writer, up to the present time, they have afforded the remains of twelve species of Amphibians, three land Snails, eight Millipedes, three Scorpions, and an Insect.

The type specimens of these animals have been placed in the Peter Redpath Museum of McGill University, and such duplicates as are available will be sent to the British Museum and that of the Geological Survey of Canada.

June 16.—"On the Estimation of Uric Acid in Urine." By F. Gowland Hopkins.

The process described depends upon the complete insolubility of ammonium urate in saturated solutions of ammonium chloride. The pure chloride is powdered, and added to the sample to complete saturation. After two hours' standing, the whole of the uric acid separates as biurate of ammonium. The urate is then decomposed with hydrochloric acid, and the liberated uric acid determined by any approved method. In contrast to the well-known Fokker-Salkowski process the separation is rapid and complete.

The author has experimented with permanganate solutions for the titration of the separated uric acid, and finds that accurate results may be obtained by their employment. For this purpose the uric acid is dissolved in 100 cc. of water, with a minimum of $Na_2CO_3$, 20 cc. of strong $H_2SO_4$ being then added, and the solution immediately titrated with one-twentieth normal permanganate of potassium. The addition of 20 per cent. $H_2SO_4$ to the previously cooled solution of sodium urate yields just such a temperature (about 60°C.) as is requisite for a determinate reaction. 1 cc. of the permanganate solution is equal to 0·00375 grm. uric acid.

**Physical Society**, June 24.—Prof. A. W. Rücker, F.R.S., in the chair.—The following communications were made:—On breath figures, by Mr. W. B. Croft. After mentioning the observations of early experimenters on the subject, the author described a method which he found to give the best results. A coin is placed on a glass plate for insulation; another glass plate, which is to receive the impression, is well polished and laid on the coin, whilst a second coin is placed above the first. The coins are put in connection with the poles of an electrical machine, giving one-inch sparks for two minutes. When the coins are removed and the glass breathed on, clear frosted pictures of the coins are seen on the glass. The microscope shows that moisture is deposited on the whole surface, the size of the minute water granulation increasing as the part of the picture is darker in shade. The thickness of the glass seemed to make no difference to the result, and several plates and coins might be piled up alternately. If carefully protected, time appears to have little effect on the figures, but they can be removed by rubbing whilst the glass is moist. Failures and their causes were discussed, and the more complex phenomena produced by strong discharges described. It was also pointed out that breath figures could be produced by laying a coin on a freshly split surface of mica, and that a coin laid on glass for some time leaves its traces. Perfect reproductions of printed matter have been obtained by placing a paper printed on one side only between two sheets of glass for ten hours. Some substances, such as silk in contact with glass, give white figures; whilst wool, cotton, &c., give black ones. Various analogous effects are noticed in the paper, and the several views put forward in explanation of the phenomena examined.—A communication on the same subject, from the Rev. F. J. Smith, was read by Prof. Perry. He had investigated some of the effects, and succeeded in photographing the impressions, prints from which were shown. He had also examined the influence of various gases on the results, and found that oxygen gave the best figures. In a vacuum no figures could be obtained. The effect of temperature had also been tested. Prof. S. P. Thompson said details of early researches were given in *Poggendorff's Annalen* for 1842. It was there pointed out that better results were obtained by putting a spark gap between the coin and the machine. Since the effects did not depend on the way in which the sparks passed, he thought it was probable that electrical oscillations were involved. He himself had worked at the subject in 1881, and recently repeated some of the experiments. Figures could be produced on almost any polished surface; he got the best results by using a small induction coil giving 3 mm. spark, for about five seconds. In 1881 he accidentally noticed that photographs could be got on ebonite. Hot coins put on uncleaned glass gave good breath figures. A member said that instead of breathing on the plates, he and Mr. Garrett had sifted finely powdered red lead on them, to get the figures. They had also fixed the figures by etching with hydrofluoric acid. Mr. Croft exhibited some figures he obtained two years ago, which were still quite distinct.—On the measurement of the internal resistance of cells, by Mr. E. Wythe Smith. After referring to the methods hitherto used, the author described a modification of Mance's test which he had recently devised. One pole of the battery to be tested is connected to the similar poles of two other batteries; each battery has a separate circuit, through which currents are allowed to pass. Selecting a point A at the opposite pole of the battery to be tested, points B and C in the circuits of the auxiliary batteries are found, whose potentials are equal to that of A. The resistances between each pair of points AB, AC, BC, are then measured by a Wheatstone's bridge. Calling these resistances $R_1$, $R_2$, and $R_3$ respectively, it is shown that the internal resistance required is given by the formula $b = x + \frac{x^2}{r} + \frac{x^3}{r^2} + \&c.$, where $x = \frac{R_1 + R_2 - R_3}{2}$, and $r$ is the external resistance of the circuit containing the battery tested. For an accumulator discharging, $b=x$ to within about 2 per cent. Prof. Perry inquired how far the results obtained agreed with those got by the older methods, and whether they depended on the time the keys were kept down. In the old methods it was assumed that an instantaneous rise in P.D. occurred on breaking the circuit. This might or might not be true. He was inclined to regard the P.D. and current as functions, both of resistance and time. The behaviour of cells seemed to indicate the existence of something like capacity, or rather, capacities and resistances in series. Prof. Ayrton said the paper was of great interest, for it made possible what could not be done before, viz. to find the resistance of a cell without appreciably altering the current through it. Although the new method required more cells, this was not prohibitive, for the result sought was of considerable scientific importance. The same method was applicable for finding the resistance of dynamo-armatures when working, a quantity which had hitherto been unattainable by direct measurement. Mr. Lane Fox said the perplexing changes in the P.D. of secondary cells were to be accounted for by changes in the electrolyte, which occurred in the pores of the plates. He could detect no flaw in the reasoning given in the paper. Dr. Sumpner remarked that the method was a valuable one, for it depended on bridge tests which could be made with considerable accuracy. On the other hand, it was a false zero method, and therefore liable to errors arising from changes of this zero. Prof. Ayrton pointed out that these errors could be eliminated by reversing the bridge battery. Mr. Rimington said although the testing currents were small they might affect the E.M.F., and thus introduce an error in $b$. This might be tested by using alternate currents and a telephone. In reply to Prof. Perry, Mr. Smith said the results agreed with those obtained by the older methods to within the limits of accuracy obtainable by the latter methods; this might amount to something like 15 per cent.—On the relation of the dimensions of physical quantities to directions in space, by Mr. W. Williams. In February 1889, Prof. Rücker recalled attention to the fact that, in the ordinary dimensional formulæ for electrical quantities, the dimensions of $\mu$ (permeability) and $k$ (specific inductive capacity) are suppressed. In the discussion on that paper Prof. S. P. Thompson pointed out that lengths should be considered as having direction as well as magnitude, for, if so regarded, difficulties arising from different units, such as *couple* and *work*, having the same dimensions, would be avoided. Developing this idea, the author takes three mutually perpendicular lines, along which lengths are measured. Calling unit lengths along these lines X, Y, and Z respectively, the various dynamical units, such as velocity, acceleration, force, work, &c., are expressed in terms of M, T, X, Y, and Z. The formulæ then denote the directional as well as the numerical relations between the units, and the dimensional formulæ are therefore regarded as the symbolical expressions of the physical nature of the quantities, so far as they depend on lengths, mass, and time. In this system areas and volumes are represented by products of different vector lengths instead of by powers of a single length, and angles and angular displacements by quotients of rectangular vectors, instead of being pure numbers. For physical purposes pure numbers may be defined as ratios of concretes of the same kind similarly directed (if directed at all). A plane angle has dimensions $X^{-1}Y$, X being in the direction of the radius, and Y that of the arc, whilst solid angles have dimensions $YZX^{-2}$, and radii of curvature $Y^2X^{-1}$. It is also shown that $\pi$ is a concrete quantity of the dimensions either of plane or of solid angle. This is of considerable importance in connection with the radial and circuital fluxes in the electromagnetic field. In deducing the dimensional formulæ for electrical and magnetic units, the rational and simplified relations given by Mr. Oliver Heaviside in the *Electrician* of October 16 and 30, 1891, are used. Instantaneous axes are taken at any point of an isotropic medium (the ether) such that X coincides with the electrical displacements, Y with that of the magnetic displacement, and Z with the intersection of the two equipotential surfaces at that point. Starting with the relation $\mu H$ = energy per unit volume, the formulæ for the various quantities in terms of $\mu$ are obtained. These simplify down to those of the ordinary electro-magnetic system by putting $\mu = 1$ and suppressing the distinction between X, Y, and Z. Similarly, commencing with $kE^2$ = energy per unit volume, formulæ in terms of $k$ are obtained, which, when simplified as above, give those of the ordinary electrostatic system. Examples of the consistent way in which the results work out are given in the paper, and the whole subject is discussed in detail, both by Cartesian and vectorial methods. The formulæ in terms of $\mu$ and $k$ are used to trace out and examine the various analogies between electro-magnetism and dynamics, thereby obtaining a connected dynamical theory of electro-magnetism. Inquiry is then made as to what dimensions of $\mu$ and $k$ in terms of M, T, X, Y, Z, render the interpretation of electrical and magnetic units simple, natural, and intelligible as a whole. The conditions imposed (for reasons stated in the paper) are, first, that the dimensions of $\mu$ and $k$ satisfy the relation $[\mu k] = Z^2T^{-2}$; second, that the powers of the fundamental units in the dimensional formulæ shall not be higher or lower than those found in the formulæ of the ordinary dynamical quantities; and, third, that quantities which are scalar or directed must also be scalar or directed when their dimensions are expressed absolutely. Subject to these conditions, it is shown that the possible dimensional values of $\mu$ and $k$ are eight in number. Of these only two lead to intelligible results. These are—

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[1] Phil. Trans., 1882, p. 621.

$$(1)\ \mu = M(XYZ)^{-1} \text{ and } k = M^{-1}XYZ^{-1}T^2.$$

and

$$(2)\ \mu = M^{-1}XYZ^{-1}T^2 \text{ and } k = M(XYZ)^{-1}.$$

According to (1), $\mu$ is the density of the medium, electrical energy is potential, and magnetic energy kinetic. By (2), $k$ is the density of the medium, electrical energy is kinetic, and magnetic energy potential. Full interpretations of the dimensional formulæ of all the electro-magnetic quantities, as obtained in accordance with the above conditions, are given in the paper. Prof. S. P. Thompson said the paper was a very important one, and thought the idea of finding dimensions for $\mu$ and $k$ which would rationalize the ordinary dimensional formulæ a great step. The use of vectors was a valuable feature, whilst the employment of X, Y, and Z instead of L removed many difficulties connected with dimensional formulæ. Other difficulties might be cleared up by paying attention to the signs of the vector products and quotients, and to the order in which the symbols were written. Another important matter was the use of Mr. Heaviside's "rational units," a system which merited serious attention. In conclusion, Prof. Thompson expressed a hope that, in accordance with the resolution of the Electrical Congress at Frankfort, both permeability and specific inductive capacity should be designated by Greek symbols. Prof. O. Henrici expressed his admiration of the way in which the subject had been treated in the paper. He had long held that clear ideas of physical quantities were best got by vectorial methods. He also congratulated the author on his treatment of plane and solid angles as concrete quantities. In a communication addressed to the Secretaries, Prof. O. J. Lodge remarked that physicists in England were more or less familiar with the advantages of retaining $\mu$ and $k$ in dimensional expressions before Prof. Rücker's paper of February 1889 brought the matter closely home to students. The system of mechanical dimensions suggested for electrical quantities in an Appendix to "Modern Views of Electricity" was not put forth as the only one possible, but as one having certain probabilities of truth in its favour. Prof. Rücker said that, although Mr. Williams and himself had talked over certain minor points in the paper, the main ideas brought forward were quite original, having been fully developed by Mr. Williams before he mentioned the subject to him (Prof. Rücker).—A paper on molecular forces, by Mr. W. Sutherland, communicated by Prof. Carey Foster, was taken as read. The Chairman announced that both this paper and that of Mr. Williams would be printed in the *Philosophical Magazine* during the long vacation, so that they could be fully discussed early next session.

**Linnean Society**, June 16.—Prof. Stewart, President, in the chair.—Mr. F. Enock exhibited some specimens of the Mustard Beetle, and gave an account of its recent depredations as observed by himself. So numerous was it that in walking down a single row of mustard, a distance of sixty-five yards, he had captured with a butterfly net upwards of 15,000, as he subsequently ascertained by counting a portion and weighing the remainder. The crop of mustard thus affected he regarded as destroyed.—Mr. R. I. Pocock exhibited and made some remarks upon a species of Peripatus (*P. juliformis*) from St. Vincent, of which five specimens had been collected by Mr. H. H. Smith for the Committee investigating the fauna and flora of the Lesser Antilles. The species was originally described so long ago as 1826, by the Rev. L. Guilding (*Zoological Journal*, vol. ii.), but from that time until the present no additional specimens had been procured there. As Guilding's types had been lost, and his descriptions are wanting in detail, this rediscovery was of considerable interest.—Mr. George Murray exhibited and described the type of a new order of Algæ, to which the name *Splachnidium rugosum* was given.—A paper was read by Prof. J. R. Henderson, entitled "Contributions to Indian Carcinology," and embodied an account of several little-known Crustaceans, and descriptions of some new species.—Mr. H. B. Guppy read a paper on "The Thames as an Agent in Plant Dispersal," in which several interesting facts were brought out, the observations being illustrated by specimens collected by the author, and a useful record given of the effects of exposure to sea-water, and of freezing, upon the germinating power of seeds.—Prof. F. Oliver gave an abstract of observations made by Miss M. F. Ewart, on some abnormal developments of the flowers of *Cypripedium*, illustrated by effective diagrams in coloured chalk.—Mr. R. I. Pocock contributed some "Supplementary Notes on the Fauna of the Mergui Archipelago," the result of his examination of some fresh material which had lately come to hand.—The evening was brought to a close by an exhibition by Mr. Carruthers, with the aid of the oxy-hydrogen lantern, of some beautiful slides of sections of fossil plants. A second series, zoological, exhibited by the President, included several minute organisms of extreme interest.—This meeting brought the session of 1891–92 to a close.

**Anthropological Institute**, June 21.—Edward B. Tylor, F.R.S., President, in the chair.—Dr. R. Wallaschek read a paper entitled "An Ethnological Inquiry into the Basis of our Musical System." In the course of the paper he pointed out that harmony is not a modern European invention, but known to many savage tribes, and even to the Hottentots and Bushmen. A regular bass accompaniment (to distinguish it from songs in harmonious intervals) is far more seldom to be met with, as the extreme simplicity of primitive songs does not admit of much variety in accompaniment. On the other hand, some savage tribes (Hottentots, Malays, Negroes) show an astonishingly great talent in accompanying European tunes by ear. Both keys, the major as well as the minor, occur in the songs of primitive races. Minor chords also occur occasionally. There is no internal connection between a peculiar key and a peculiar mood or disposition of mind. The diatonic scale does not seem to be a more recent invention than the pentatonic. The most ancient diatonic division is to be met with in instruments (pipes, flutes) of the Stone period. This early occurrence seems to be due to the fact that the diatonic scale is the most natural for the player's fingers, while it is at the same time the most effective. The diatonic system is neither an "artistic invention," nor a "scientific discovery," nor is it "natural" for the voice or the ear, nor based upon the laws and conditions of sounds, but it is the most natural for the hand, and the most practical for playing instruments.—Prof. Basil Hall Chamberlain then read a paper on some minor Japanese religious practices. After mentioning various miscellaneous usages and superstitions, the author treated chiefly of Japanese pilgrims and their ways, illustrating his remarks by an exhibition of a large collection of charms, sacred pictures, pilgrims' dresses, &c., brought together partly by himself, partly by Mr. Lafcadio Hearn. The collection included articles from the Shinto shrines of Ise and Izumo, from the "Thirty-three Holy Places" of Central Japan, from the "Eighty-eight Holy Places" of the island of Shikoku, from the temple of Asakusa in Tokyo, &c. The most curious was a sacred fire-drill from the great Shinto shrine of Izumo. This, together with a few of the other articles, has been presented by Prof. Chamberlain to the Pitt-Rivers Museum at Oxford. Another feature of the paper was the translation given of a Buddhist legend explaining the origin of the pilgrimage to the "Thirty-three Holy Places," and of some of the hymns intoned by the pilgrims.

**Geological Society**, June 22.—W. H. Hudleston, F.R.S., President, in the chair.—The following communications were read:—Contribution to a knowledge of the Saurischia of Europe and Africa, by Prof. H. G. Seeley, F.R.S. The Saurischia are defined as terrestial unguiculate Ornithomorpha, with pubic bones directed downward, inward, and forward to meet in a ventral union. The forms of the pelvic bones vary with the length of the limbs, the acetabulum becoming perforate, the ilium more extended, the pubis and ischium more slender, and the sacrum narrower as the limb-bones elongate. The order is regarded as including the Cetiosauria, Megalosauria, and Aristosuchia or Compsognatha. The Cetiosaurian pelvis has been figured in the *Quart. Journ. Geol. Soc.*; and a restoration is now given of the pelvis in *Megalosaurus*, *Streptospondylus*, and *Compsognathus*. The characters of the skull are evidenced by description of the hinder part of the skull in *Megalosaurus* found at Kirklington, and preserved in the Oxford University Museum. In form and proportions it closely resembles *Ceratosaurus*, and the corresponding region of the head in Jurassic Ornithosauria. The brain-cavity and cranial nerves are described, and contrasted with those of *Ceratosaurus*. The skull in Cetiosauria, known from the American type *Diplodocus*, is identified in the European genus *Belodon*, which is regarded as a primitive Cetiosaurian. Part 2 discusses the pelvis of *Belodon*, restored from specimens in the British Museum, and regarded as Cetiosaurian. A restoration of the shoulder-girdle is made, and found to resemble that in Ichthyosaurs, Anomodonts, and Dinosauria. The vertebræ in form and articulation of the ribs are Saurischian, the capitular and tubercular facets being vertical in the dorsal region, and not horizontal as in Crocodiles. The humerus shows some characters in common with that of *Stereorachis dominans*, in the epicondylar groove. In general character the limb-bones are more crocodilian than the axial skeleton. The interc avicle is described and regarded as a family characteristic of the Belodontidæ. In the third part an account is given of *Staganolepis*, which is regarded as showing a similar relation with the Megalosauria, to that of *Belodon* with the Cetiosauria. This interpretation is based chiefly upon the identification of the pubic bone in *Staganolepis*, which has the proximal end notched as in *Zanclodon* and *Streptospondylus;* and the inner ridge at the proximal end is developed into an internal plate. A note follows on the pelvis of *Aëtosaurus*, which is also referred to the Saurischia on evidence of its pelvic characters, approximating to the Cetiosaurian sub-order. Part 4 treats of *Zanclodon*, which is regarded as closely allied to *Massospondylus*, *Euskelesaurus*, and *Streptospondylus*. It is founded chiefly on specimens in the Royal Museum at Stuttgart, and in the University Museum at Tübingen. The latter are regarded as possibly referable to *Teratosaurus*, but are mentioned as *Zanclodon Quenstedti*. The pelvis is described and restored. *Zanclodon* has the cervical vertebræ relatively long, as compared with *Megalosaurus*, and small as compared with the dorsal vertebræ, which have the same Teleosauroid mode of union with the neural arch as is seen in *Streptospondylus* and *Massospondylus*. The sternum, of Pleininger, is the right and left pubic bones; but there is much the same difference in the proximal articular ends of those bones in the fossils at Stuttgart and Tübingen, as distinguishes corresponding parts of the pubes in *Megalosaurus* and *Streptospondylus*. The ilium is more like that of *Palæosaurus* and *Dimodosaurus*. The limb-bones and digits are most like those of *Dimodosaurus*, but the teeth resemble *Palæosaurus*, *Euskelesaurus*, *Megalosaurus*, and *Streptospondylus*. Part 5 discusses *Thecodontosaurus* and *Palæosaurus* upon evidence from the Dolomitic Conglomerate in the Bristol Museum. An attempt is made to separate the remains into those referable to *Thecodontosaurus* and those belonging to *Palæosaurus*. The latter is represented by dorsal and caudal vertebræ, a scapular arch, humerus, ulna (?), metacarpals, ilium, femur, tibia, fibula, metatarsals, and phalanges. These portions of the skeleton are described. There is throughout a strong resemblance to *Zanclodon* and other Triassic types. A new type of ilium, and the humerus originally figured, are referred to *Thecodontosaurus*. Part 6 gives an account of the South African genus *Massospondylus*. It is based partly upon the collection from Beaucherf, in the Museum of the Royal College of Surgeons, referred to *M. carinatus;* and partly upon a collection from the Telle River, obtained by Mr. Alfred Brown of Aliwal North, referred to *M. Browni*. The former is represented by cervical, dorsal, sacral, and caudal vertebræ; ilium, ischium, and pubis; femur, tibia; humerus, metatarsals, and phalanges. The latter is known from cervical, dorsal, and caudal vertebræ, femur, metatarsals, and bones of the digits. The affinities with *Zanclodon* are, in some parts of the skeleton, stronger than with *Euskelesaurus*. Part 7 gives an account of *Euskelesaurus Browni*, partly based upon materials obtained by Mr. Alfred Brown from Barnard's Spruit, Aliwal North, and partly on specimens collected by the author, with Dr. W. G. Atherstone, Mr. T. Bain, and Mr. Alfred Brown, at the Kraai River. The former series comprises the maxillary bone and teeth, vertebræ, pubis, femur, tibia and fibula, phalanges, chevron bone and rib. The latter includes a cervical vertebra and rib, and lower jaw. The teeth are stronger than those of *Teratosaurus*, or any known Megalosaurian. The anterior part of the head was compressed from side to side, and the head in size and form like *Megalosaurus*, so far as preserved. The pubis is twisted as in *Staganolepis* and *Massospondylus*, with a notch instead of a foramen at the proximal end, as in those genera; and it expands distally after the pattern of *Zanclodon*. The chevron bones are exceptionally long, and the tail appears to have been greatly elongated. The femur is intermediate between *Megalosaurus* and *Palæosaurus*, but most resembles *Zanclodon* and *Massospondylus*. The tibia in its proximal end resembles many Triassic genera; and in its distal end is well distinguished from *Massospondylus* by its mode of union with the astragalus. The claw-phalanges are convexly rounded, being wider than is usual in Megalosauroids. The lower jaw from the Kraai River gives the characters of the articular bone, and the articulation, as well as of the dentary region and teeth. The cervical vertebra is imperfect, but is remarkable for the shortness of the centrum, being shorter than in *Megalosaurus*. In Part 8 an account is given of *Hortalotarsus skirtopodus* from Barkly East, preserved in the Albany Museum. It is a Euskelesaurian, and exhibits the tibia and fibula, and tarsus. There is a separate ossification for the intermedium, which does not form an ascending process; and the astragalus is distinct from the calcaneum. The metatarsals are elongated, and the phalanges somewhat similar to those of *Dimodosaurus*. Part 9, in conclusion, briefly examines the relations of the Saurischian types with each other, and indicates ways in which they approximate towards the Ornithosauria. It is urged that the Ornithosauria are as closely related to the Saurischia as are the Aves to the Ornithischia; and that both divisions of the Saurischia approximate in *Staganolepis* and *Belodon*. Finally, a tabular statement is given of the distribution in space and time of the 25 Old World genera which are regarded as probably well established. Eight of these are referred to the Cetiosauria, thirteen to the Megalosauria, and four to the Aristosuchia or Compsognatha.—Mesosauria from South Africa, by Prof. H. G. Seeley, F.R.S.—On a new Reptile from Welte Vreden, *Eunotosaurus africanus* (Seeley), by Prof. H. G. Seeley, F.R.S. The President observed that there could be no question as to the great value of these papers, the first of which especially was the outcome of years of experience and study on the part of the author. It was only right to remark that the paper on Saurischia was received by the officers of the Society early in *April*. Since that date Prof. Marsh, in his notes on Triassic Dinosauria (which did not appear till *May* 24), had published, as regards *Zanclodon*, conclusions similar to those at which the author (Prof. Seeley) had already arrived. Mr. E. T. Newton also spoke. Prof. Seeley drew attention to a photograph of *Hortalotarsus*, a reproduction of a sketch made at Barkly East, before the original specimen had been destroyed in the process of blasting the rock.—The dioritic picrite of White Hause and Great Cockup, by J. Postlethwaite.—On the structure of the American Pteraspidian, *Palæaspis* (Claypole), with remarks on the family, by Prof. E. W. Claypole.—Contributions to the geology of the Wengen and St. Cassian strata in Southern Tyrol, by Maria M. Ogilvie, B.Sc. (Communicated by Prof. C. Lapworth, F.R.S.)—Notes on some new and little-known species of Carboniferous *Murchisonia*, by Miss Jane Donald. (Communicated by J. G. Goodchild.)—Notes from a geological survey in Nicaragua, by J. Crawford, State Geologist to the Nicaraguan Government (Communicated by Prof. J. Prestwich, F.R.S.)—Microzoa from the phosphatic chalk of Taplow, by F. Chapman. (Communicated by Prof. T. Rupert Jones, F.R.S.)—On the basalts and andesites of Devonshire, known as felspathic traps, by Bernard Hobson.—Notes on recent borings for salt and coal in the Tees salt-district, by Thomas Tate.

### MELBOURNE.

**Royal Society of Victoria**, March 12.—Annual Meeting.—The following officers were elected for the year:—President: Prof. Kernot. Vice-Presidents: Messrs. E. J. White, H. K. Rusden. Hon. Treasurer: Mr. C. R. Blackett. Hon. Librarian: Dr. Dendy. Hon. Secretaries: Prof. Spencer, Mr. A. Sutherland.—The following paper was read:—Preliminary notice of Victorian earthworms: Part 2, the genus Perichæta, by Prof. Spencer. The author described 18 species collected in Victoria, of which 16 are new.

May 13.—The following papers were read:—On confocal quadrics of moments of inertia pertaining to all planes in space, and loci and envelopes of straight lines whose moments of inertia are of constant magnitude, by Martin Gardiner.—Further notes on the oviparity of the larger Victorian Peripatus, generally known as *P. leuckartii*, by Dr. Dendy. In this paper the author replied to some remarkable strictures recently passed upon his work by Mr. J. J. Fletcher in the Proceedings of the Sydney Linnean Society. He showed that at the time of writing his first paper on this subject nothing was known as to the method of reproduction of *P. leuckartii*, Mr. Fletcher's brief footnote to the effect that one specimen dissected was found to be pregnant not of necessity implying the presence of developed embryos within the egg-case. The Victorian specimens, containing in their uterus large eggs, might with equal truth be described as pregnant. Dr. Dendy brought forward evidence proving conclusively that in the eggs investigated by him development had gone on normally outside of the body for a period exceeding eight months, one of them at the close of this time containing a perfect young form with even the pigment developed. Since the publication of his first paper, but not prior to this, Mr. Fletcher had shown that the New South Wales *Peripatus leuckartii* was undoubtedly viviparous; and Dr. Dendy suggested that if, as seems most probable, the Victorian species is oviparous, then his original idea of its being a distinct species from the New South Wales form may probably be correct.

### PARIS.

**Academy of Sciences**, June 27.—On the local disturbances produced underneath a heavy load uniformly distributed along a straight line perpendicular to the two edges, on the upper surface of a rectangular beam of indefinite length laid down on a horizontal surface, or on two transverse supports equidistant from the load, by M. J. Boussinesq.—Contribution to the study of the function of camphoric acid, by M. A. Haller. —On the presence and the nature of the phylacogenic substance in the ordinary liquid cultivations of *Bacillus anthracis*, by M. Arloing. The liquid was carefully siphoned off from a large cultivation of the bacillus which had been allowed to stand for a considerable time. The usual porcelain filters were not employed, as they are apt to intercept most of the prophylactic substances. A liquid perfectly free from the anthrax bacillus having thus been obtained, two solutions in glycerine were prepared, the one containing the substances soluble in alcohol, the other those precipitated by alcohol. Of six lambs, two received subcutaneous injections of the former, two of the latter solution, and the rest of neither. Eight days afterwards all six were inoculated with a very virulent dose of the bacillus. The only survivors were those inoculated with the matter soluble in alcohol, thus proving that the prophylactic substance belongs to this group.—On the determination of the angle of polarization of Venus, by M. J. J. Landerer. By almost daily observations, extending from April 29 to June 8, the angle of polarization of Venus was found to vary between 45°·17 and 27°·51, using an instrument of 135 mm. aperture, to which a Cornu photo-polarimeter was adapted. The author concludes that the light from the crescent of Venus is not polarized, and hence that almost the entire visible surface of the planet is constituted by a thick layer of clouds. At the poles, however, permanent spots are observable, which are due to part of the solid surface protruding beyond the cloudy mass.—On the variations in temperature of water suddenly compressed to 500 atmospheres between 0° and 10°, by M. Paul Galopin. An account of the first of a series of experiments to be made in M. Raoul Pictet's laboratory to determine the heat produced by the adiabatic compression of a large number of liquids between − 200° and + 200°, under sudden variations of pressure amounting to 1000 atmospheres. The apparatus consists of a steel cylinder provided with a thermometer 1 m. long, capable of measuring 0°·01. Pressure is applied by means of a Cailletet pump, and the whole apparatus is immersed in a large calorimeter with quadruple envelopes. The results obtained, which vary from 0°·20 at 0°·4 to 0°·59 at 10°, show that the increase of pressure lowers the temperature of maximum density of water for that particular pressure, and that under high pressures it corresponds nearly to the freezing-point.—Measurement of the dielectric constant by electro-magnetic oscillations, by M. A. Perot. This measurement is based on the law formulated by Blondlot, according to which the period of the resonators is proportional to the square root of their capacities. The value obtained for essence of terebenthine was 2·25, that for ice between 60 and 71, in confirmation of previous results.—On the conductivity of a gas inclosed between a cold metal and an incandescent body, by M. Edouard Branly.—On the physiological effects of alternating currents with sinusoidal variations: process of administering them in electro-therapeutics, by M. A. d'Arsonval. The law indicated by the results of the experiments is that the intensity of the motor or the sensory reaction is proportional to the variation of potential at the point excited. Although oscillations of great frequency seem to have but faint physiological effects, a careful analysis shows that the absorption of oxygen and the elimination of carbonic acid in the lungs is greatly augmented.—On aluminium, by M. Balland. A series of experiments to prove that aluminium is well-suited for domestic utensils, being not more attacked by air, water, wine, coffee, milk, butter, &c., than other metals used for such purposes.—Action of chlorine on the alcohols of the fatty series, by M. A. Brochet.—On asboline (pyrocatechine and homopyrocatechine), by MM. Béhal and Desvignes.—On the vegetable cholesterines, by M. Gérard.—Researches on the adulteration of the essence of sandalwood, by M. E. Mesnard.—On two specimens of the waters of the Arctic seas, by M. J. Thoulet. —New remarks on "pœcilogony," by M. Alfred Giard.—On a sporozoarian parasite of the muscles of the Decapod Crustaceans, by MM. F. Henneguy and P. Thélohan.—The first phases in the development of certain nematoid worms, by M. Léon Jammes.—A contribution to the history of ambergris, by M. S. Jourdain.—On the *brunissure*, a disease of the vine caused by the *Plasmodiophora Vitis*, by MM. P. Viala and C. Sauvageau. —On the secretion of oxygen in the natatory vessel of the fishes, by M. Chr. Bohr.—Physiological action of mountain climates, by M. Viault. The effects of a high elevation, though powerfully beneficent for dyspeptics, neurasthenics, and tuberculous patients, must be long continued to be permanent. The effects are due to an increase in the number of blood corpuscles and in the respiratory power of the blood.—Permanent abolition of the chromogenic function of the *Bacillus pyocyaneus*, by MM. Charrin and Phisalix.

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